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COMMON MOSSES. ACCORDING TO HABITAT. A NON-TECHNICAL DESCRIPTION BASED ON MACROSCOPICAL CHARACTERS

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INTRODUCTORY

Few groups of plants are of more importance in giving a charm and attractiveness to the out-of-doors, than the mosses. Perhaps none are less appreciated, for quite apart from their beauty, it must be remembered that in the economy of the earth, they play a rôle second only to the lichens.

Lack of familiarity with these forms is largely due to the fact that their identification is based upon features so minute as to require a microscope to reveal them and, furthermore the descriptions are so burdened with technical terms as to discourage the beginner. The following pages are designed to enable the beginner to become acquainted with our common mosses, through the use of his own unaided eye.

Everyone knows that there are two distinct portions to a moss plant. First, the stem, bearing minute leaves. This part of the plant is the *gametophyte* and may vary in size from a fraction of an inch to two or more inches in length (Fig. 2, *E*). From the lower end of the gametophyte are minute hair-like outgrowths, which penetrate the soil. These outgrowths are known as the *rhizoids* (Fig. 2, *E*). Secondly, that part of the plant which arises from the gametophyte bears a stalk called the *seta*, which in its turn is capped with a structure resembling a box, called the *capsule*. The capsule (Fig. 3) is variously crowned by a hood or *calyptra* (Fig. 2, *E*). That part of the plant comprising seta, [No. 2, Vol. 16, of TORREYA, comprising pp. 33-54, was issued 26 February 1916.]

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capsule and calyptra is known as the *sporophyte* (Fig. 2, *E*). The capsule contains minute bodies, the *spores*.

What is the life-history of a moss plant? Let us take a capsule

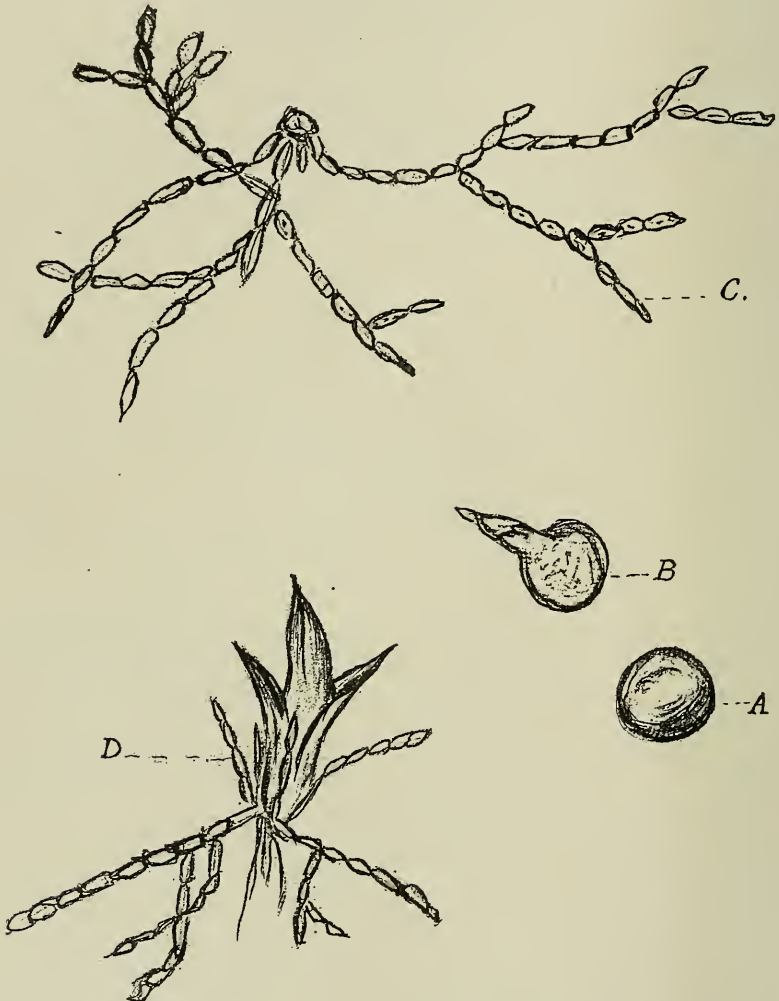


FIG. 1. A, spore; B, germinating spore; C, protonema; D, bud. All much magnified.

and with a pair of forceps gently lift off the calyptra. We shall find that the capsule is covered by a lid called the *operculum*

(Fig. 2, *O*). The operculum is cut off by a ring of cells called the *annulus*. Remove the operculum, then with a hand-lens carefully examine the rim of the capsule and note the fringe of teeth

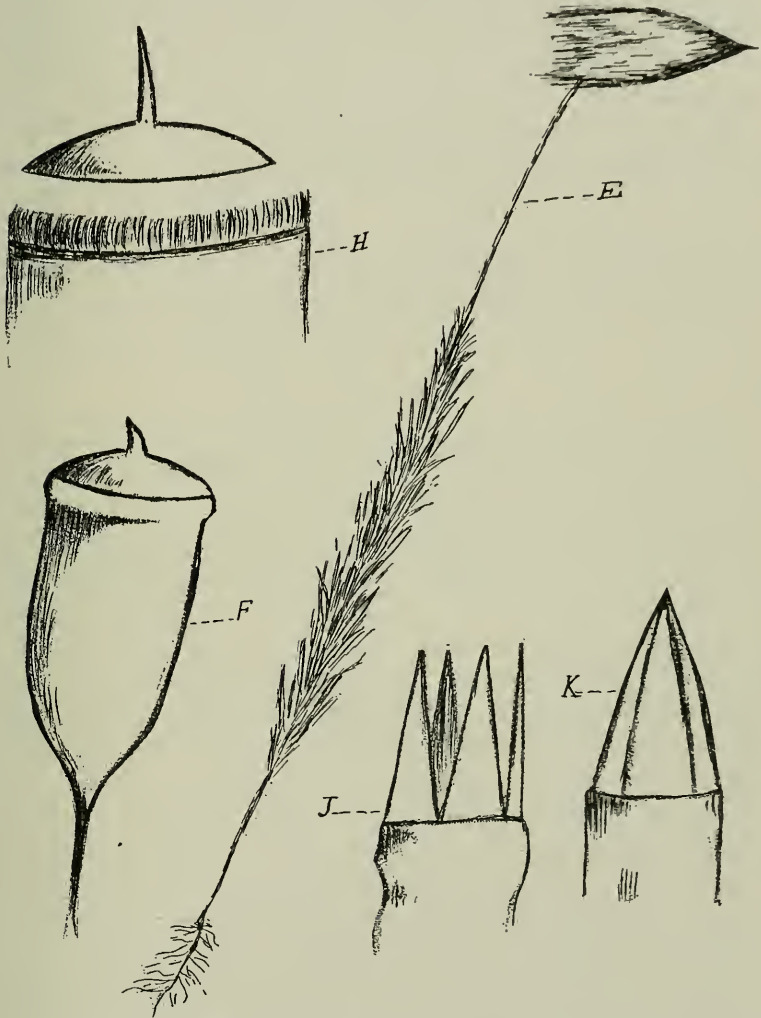


FIG. 2. *E* is a moss plant, consisting of an upper or sporophyte portion, composed of a seta, surmounted by a capsule with calyptra, and a lower portion, the gametophyte, consisting of rhizome, stem and leafy portion; *F*, capsule with lid closed; *H*, the same, with lid removed; *J*, peristome in dry weather; *K*, the same in wet weather, or before the maturity of the spores.

which border its mouth. This fringe is called the *peristome* (Fig. 5). When the spores are mature, the annulus by its contractions forces off the operculum and calyptra. The dispersal of the spores is brought about by the opening and closing of the peristome which acts as a sifter for the spores. The peristome is very hygroscopic and thus serves to control spore dispersal according as the conditions are favorable or unfavorable (Fig. 2).

The spores are carried by the wind and if a favorable substratum be found, the spore will germinate. The germination of the spore consists in the rupture of its wall followed by the protrusion of the germ tube (Fig. 1, *A, B*). This soon produces branching algal-like filaments known as the protonema. The protonema produces rhizoids, these absorb nourishment from the substratum. Buds soon appear on the branches. These buds grow out to be the leafy stem or gametophyte of the moss plant (Fig. 1, *C, D*).

Sex organs are developed on the ends of stems or branches. The male branches are called the *antheridial* branches (Fig. 4). The female branches are called the *archegonial*. Plants are either *monoecious* or *dioecious* according as antheridia or archegonia are found on one or separate plants. Antheridia are usually carried to the archegonia by a drop of water. After fertilization, the growth of the sporophyte generation commences. The germination of the gametospore or fertilized egg results in the development of seta and capsule with its contained spores and also the protecting modifications, the peristome, operculum and calyptra (Fig. 2).

In order to ascertain the name of a particular moss, several features must be noted.

First of all, the place of origin of the seta on the stem. This is of importance, for it enables one to see at a glance the two great divisions into which all mosses are divided. If the seta originates at the apex of the leafy stem, then all forms having this arrangement are grouped together under the division known as the *acrocarpous* forms. If, on the other hand, the seta arise from a lateral branch, then mosses of this kind are included in the division called the *pleurocarpous*.

The second point to note are the conditions or surroundings in which the plant lives. This must be carefully noted. The place upon which it grows is called its *habitat*. The habitat may be the *deep woods* or the *open fields*; upon *rocks* or *trees*; while others may be *water loving*. These five habitats will cover practically all the conditions under which mosses may be found.

Another feature which will assist the beginner in the identification of his specimen is the form and shape of the calyptra. The calyptra may be *cucullate*, that is hood shaped, but opened on one side only; or it may be *mitrate*; that is hooded, but opened in several places.

Fourth, and a most important character, is the shape of the capsule. This may be long and cylindrical or short or ovoid, or urn shaped, or it may be round or globose.

HOW TO USE THE KEY

Care should be taken in selecting a plant, that it be fruiting. The greater number of sterile plants are impossible of determination for the beginner. Place the specimen in an envelope or bag, carefully noting on the outside of the wrapper the date and place and also the habitat or conditions under which the plant is growing.

The following is the order to observe for classification.

1. Does the fruiting body grow from the end of the leafy portion, that is the gametophyte portion, or does it grow from a side or lateral branch? If from the first, then the specimen belongs to the *acrocarpous* group of mosses; if from the second then it belongs to the *pleurocarpous* group. The collector will find the key divided first into these two groups; the acrocarpous mosses are discussed in the first half, the pleurocarpous in the second.

2. There are *five habitats* considered; here careful observations must be made. If the specimen be found on Habitat 1, that is, on humus, logs or ground in woods, then note from which of these particular conditions the specimen was picked. If from Habitat 2, that is, on the bark of trees, note whether the specimen grew on the upper part of the bark, on the middle, or at the base about the roots. Is the bark living or dead? From Habitat 3,

distinguish between aquatic and sub-aquatic; if entirely submerged or above water mark. Distinguish between swamp plants or brook-loving forms. Habitat 4 is fields, roadways and waste places. Habitat 5 considers those plants found on stones or rocks. Note carefully whether the plant grows from a slight soil substratum or whether it grow quite close to the rock.

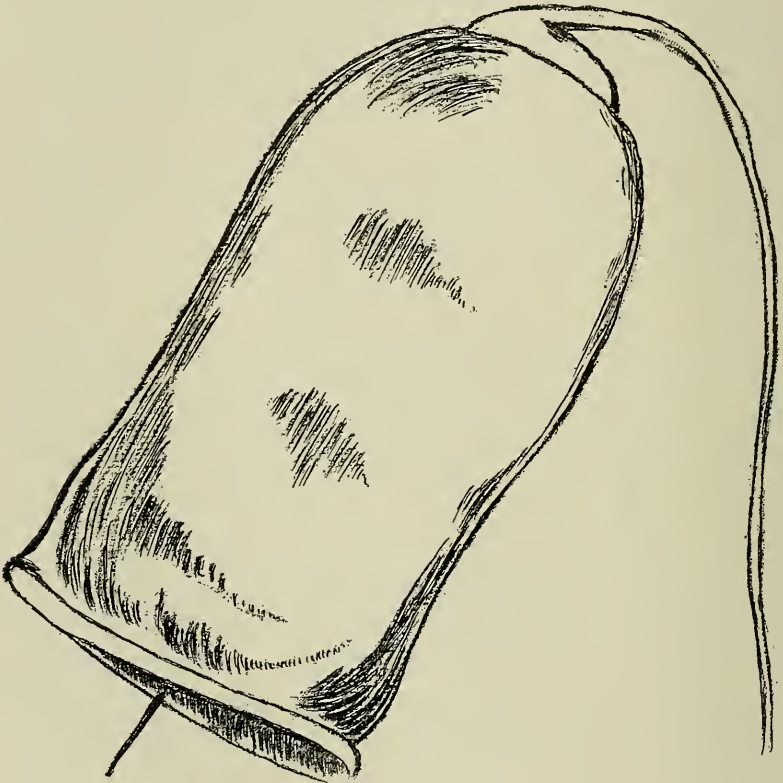


FIG. 3. Capsule, with calyptra removed.

3. The calyptra is the next point of classification. Is the calyptra *cucullate* or *mitrate*? Often the calyptra is wanting, then we pass on to:

4. The capsule: This is a very important diagnostic character. Most capsules are either cylindrical or ovoid. A few assume odd shapes; as the urn of *Pottia*; the square of *Polytrichum*; the sphere

of *Bartramia*; the ventricose of *Webera*. Then, the position is of importance, too. Some are quite *erect*; others *sub-erect*; again others are *horizontal*; others inclined to quite *pendulous*. Some may be quite *exserted* beyond the gametophyte, while others may be quite *immersed* in the leafy portion, as in *Neckera*.

5. Hold the leaf up to the light and with a hand lens determine if a *costa* be present or not. If present, note the distance which it occupies with regard to length and breadth of leaf and note, too, if it is prolonged beyond the apex, that is, is it excurrent? Leaves without costa are said to be *ecostate*.

6. The margin is next to be examined. Is it toothed, that is serrate, or entire? Sometimes, mosses are slightly serrate at apex and entire for the remainder of the leaf.

7. Note the apex of the leaf. Most mosses will conform to one of two classes, that is, the acute or acuminate apex. These often grade into each other. Sometimes an obtuse apex is found or one quite rounded as in *Calliigon*.

After "running down" to this point turn to the description of the genus which you suspect your specimen to be. This description will be found in the second part of the work and arranged in alphabetical order.

The mosses described are the common mosses of the local flora range. That the list is limited is due to the fact that only macroscopic characters are noted. This work has not attempted anything more than the simplest presentation. Technical terms have been avoided as much as pos-



FIG. 4. Male plant, with rosette of leaves at the summit.

sible and in no case has a diagnostic character been cited which would depend upon the microscope for verification.

The literature on the systematic classification of the mosses within the local flora range is, in part, as follows:

Musci Appalachiani, C. F. Austin, 1870.

Bryophyta, a contribution, E. A. Rau, Geological Survey, N. J. 1889.

Preliminary List of Mosses of Staten Island, E. G. Britton. Proceedings of the Natural Science Association, S. I. 1890.

Cryptogamic Notes from Long Island, S. E. Jelliffe, Bulletin, Torrey Botanical Club. 1894.

Mosses with a Hand-lens and Microscope, A. J. Grout.

Catalogue of the Bryophyta and Pteridophyta of Penn, T. C. Porter. 1904.

Bryophyta of Connecticut, A. N. Evans and G. E. Nichols, State Geological Survey. 1908.

ACROCARPOUS FORMS

I. In woods: on humus, logs, or ground

B. CALYPTRA CUCULLATE.

C. CAPSULE CYLINDRIC, MOSTLY ERECT.

D. Costate.

E. Entire.

F. Acuminate.

Dicranella heteromalla.

Weisia viridula.

Tortella caespitosa.

Ditrichum pallidum.

tortile.

Tortula.

FF. Obtuse or acuminate.

Barbula.

Tortula.

Leucobryum glaucum.

Georgia pellucida.

EE. Serrate.

F. Acuminate.

Ditrichum tortile.

Dicranella heteromalla.

FF. Acute.

Fissidens.

CC. CAPSULE UNSYMMETRIC, INCLINED, OBLIQUE PENDULOUS.

D. Costate.

E. Entire.

F. Acuminate.

Dicranella heteromalla.

Dicranum scoparium.

Ceratodon purpureus.

EE. Serrate.

F. Acuminate.

Pohlia nutans.

Rhodobryum roseum.

Bryum bium.

caespiticium.

argenteum.

Leptobryum pyriforme.

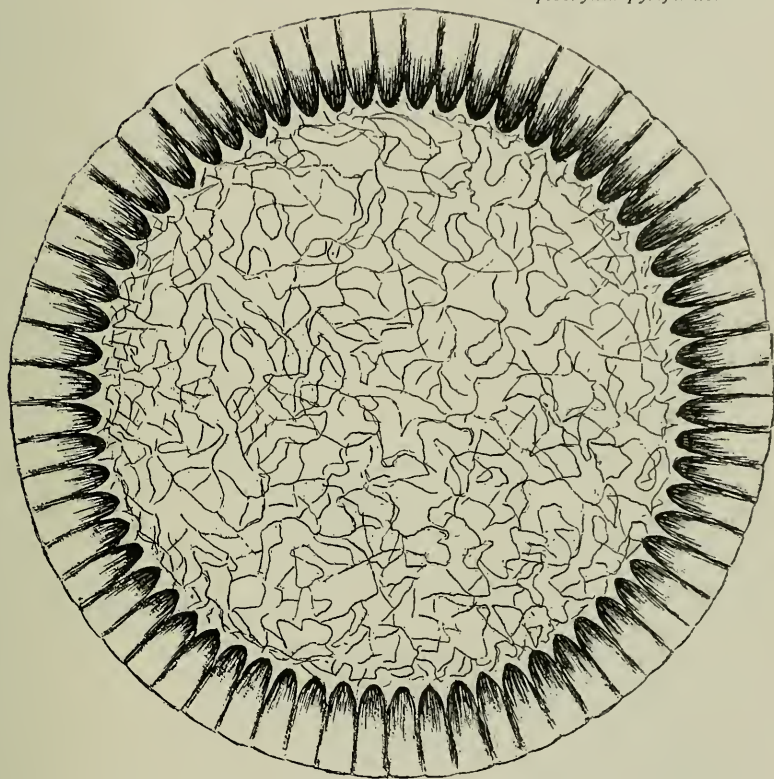


FIG. 5. Peristome of Haircap moss.

FF. Acute or obtuse or rounded.

Aulacomnium heterostichum.

Mnium.

Funaria hygrometrica.

CCC. CAPSULE GLOBOSE.

* Immersed or slightly emergent.

D. Costate.

E. Entire.

F. Acuminate.

Phascum cuspidatum.

** Long exserted.

- D. Costate.
 E. Serrate.
 F. Acuminate.
- Bartramia pomiformis.*
- BB. CALYPTRA CONICAL.
- C. CAPSULE CYLINDRIC.
- D. Costate.
 E. Entire.
 F. Acute.
- Barbula.*
- EE. Serrate.
- Pogonatum brevicaule.*
Catherinia angustata.
undulata.
- CC. CAPSULE URN SHAPED.
- D. Costate.
 E. Entire.
 F. Acute.
- Potlia truncatula.*
Physcomitrium turbinatum.
- CCC. CAPSULE SQUARE OR ANGLED.
- D. Costate.
 E. Serrate.
 F. Acuminate.
- Polytrichum commune.*
ohioense.
- CCCC. CAPSULE VENTRICOSE.
- D. Costate.
 E. Serrate at apex.
- Webera sessilis.*
- DD. Ecostate.
- Buxbaumia aphylla.*

II. On trees

- B. CALYPTRA CUCULLATE.
- C. CAPSULE SYMMETRIC ERECT.
- D. Costate.
 E. Entire.
 F. Acute.
- Drummondia clavellata.*
Tortella caespitosa.
- BB. CALYPTRA MITRATE.
- C. CAPSULE CYLINDRIC.
- D. Costate.
 E. Entire.
 F. Acute or obtuse.
- Orthotrichum strangulatum.*
Ulata crispa.

III. Aquatic or sub-aquatic

B. CALYPTRA CUCULLATE.

C. CAPSULE CYLINDRIC, INCLINED OR ERECT.

D. Costate.

E. Entire.

F. Acute or obtuse.

Conomitrium (Fissidens)
Julianus.

EE. Serrate.

F. Acuminate.

Bryum bimum.

FF. Acute.

Aulacomnium palustre.

CC. CAPSULE GLOBOSE.

D. Costate.

E. Serrate.

F. Acuminate.

Philonotis fontana.

DD. Ecostate.

E. Entire.

F. Acute.

Sphagnum.

IV. Open fields, pastures, roadways and waste places

B. CALYPTRA CUCULLATE.

C. CAPSULE CYLINDRIC.

D. Costate.

E. Entire.

F. Acuminate.

Weisia viridula.
Ceratodon purpureus.
Bryum argenteum.
caespiticiun.
Ditrichum pallidum.
Dicranella heteromalla.

CC. CAPSULE UNSYMMETRIC, INCLINED.

D. Costate.

E. Entire.

F. Acute or acuminate.

Mnium.
Funaria hygrometrica.
Bryum argenteum.
caespiticiun.

CCC. CAPSULE GLOBOSE.

* Immersed or slightly emergent.

- D. Costate.
 E. Entire.
 F. Acuminate.
- Phascum cuspidatum.*

** *Long exserted.*

- D. Costate.
 E. Serrate.
 F. Acuminate.
- Bartramia pomiformis.*

BB. CALYPTRA CONICAL.

C. CAPSULE SQUARE OR ANGLED.

- D. Costate.
 E. Serrate.
 F. Acuminate.
- Polytrichum commune.*

CC. CAPSULE CYLINDRIC.

- D. Costate.
 E. Serrate.
 F. Acuminate.
- Pogonatum brevicaule.*
Catherina angustata.
undulata.

V. Stones

B. CALYPTRA CUCULATE .

C. CAPSULE CYLINDRIC, ERECT; OR UNSYMMETRIC
 INCLINED.

- D. Costate.
 E. Entire.
 F. Acuminate.
- Weisia viridula.*
Tortella tortuosa.
- FF. Obtuse or acute.
- Tortula muralis.*
Barbula.
Rhacomitrium aciculare.
Orthotrichum anomalum.
- EE. Serrate.
 F. Acuminate.
- Dicranum.*
Leplobryum pyriforme.
Bryum caespiticium.
argentum.
Mnium.
Fissidens incurvus.

BB. CALYPTRA MITRATE OR CONICAL.

C. CAPSULE IMMERSED, CYLINDRICAL.

D. Costate.

E. Entire.

F. Acuminate.

Grimmia.

CC. CAPSULE IMMERSED SPHERICAL.

D. Ecostate.

E. Entire.

F. Acute.

Hedwigia albicans.

CCC. CAPSULE SQUARE OR ANGLED.

D. Costate.

E. Serrate.

F. Acute.

Polytrichum.

CCCC. CAPSULE CYLINDRIC, EXsertED.

D. Costate.

E. Entire.

F. Acute.

Ulota americana.

CCCCC. CAPSULE URN SHAPED, EXsertED.

D. Costate.

E. Serrate.

F. Acute.

*Physcomitrium turbinatum.**(To be continued)*A NEW SPECIES OF METZGERIA FROM THE
GALAPAGOS ISLANDS*

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BY ALEXANDER W. EVANS

The collection of Hepaticae made in the Galapagos Islands by Dr. Alban Stewart, while acting as botanist to the Expedition of the California Academy of Sciences, includes between fifteen and twenty species. One of the most interesting of these is the *Metzgeria* described below. It is not only a distinct addition to the genus but it apparently represents the first member of the Metzgeriaceae (Jungermanniales anacrogynae) to be reported from this group of islands.

* Contribution from the Osborn Botanical Laboratory.